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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jeffrey L. MILNER et al.

Application No.: 10/756,711

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Title: EXTENDED DRAIN, THERMALLY STABLE, GEAR OIL FORMULATIONS

Examiner: Amy T. Lang

Group Art Unit: 3731

DECLARATION OF JEFFREY L. MILNER

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Jeffrey L. Milner, hereby declare as follows:

1. I am presently employed by Afton Chemical Corporation, Richmond, Virginia, as an Advisor. I have over 12 years of experience in the area of gear and transmission lubricant research with Afton Chemical Corporation (formerly Ethyl Corporation). Prior to my employment with Afton Chemical in Driveline Lubricants, I have an additional 20 years at Afton Chemical Corporation (formerly Ethyl Corporation) in manufacturing quality control, engine oil and tractor transmission oil development, and research and development in the identification and quantification of lubricant components.

2. I graduated from the University of Missouri in St. Louis, MO in 1994 with a Bachelor of Arts degree in Chemistry and previously graduated from Jefferson College in MO with an Associate of Arts Degree in 1981.

3. I am the author, or co-author, of over 8 papers in reviewed Journals, relating to gear and transmission lubricants, and am an inventor on 2 U.S. Patents.

4. I am a named inventor of U.S. Application No. 10/225,040. I have read the specification and claims and am familiar with the application. I have also reviewed the Office Action mailed August 5, 2008 and the Advisory Action mailed October 22, 2008. Additionally, I have reviewed the U.S. Patent Publication 2003/0171222 to Sullivan (referred to herein as "Sullivan") cited in the Office Action.

5. The Advisory Action states that "Sullivan teaches a mixture of polysulfides, similar to the instant claims, so that it would have been obvious for the mixture to also achieve a sulfur activity greater than 126 in the copper corrosion test." The Advisory Action further states "the sulfur activity is merely an optimum value and therefore obvious to change or alter. Applicant's arguments regarding unexpected results must be supported by an appropriate affidavit or declaration." The Advisory Action also states that "the examples in the instant specification are not commensurate in scope with the claims."

6. For the following reasons, I believe that the conclusions summarized in Paragraph 5 above are incorrect.

7. To the best of my knowledge and belief, upon reading the Office Action, Advisory Action, and the Sullivan reference, the polysulfide mixture of Sullivan is not similar to the claimed polysulfide mixture. The sulfur activity and the CCT values of the presently claimed polysulfide mixture are critical for selecting the polysulfides for the mixture in the practice of the invention. The polysulfide mixture disclosed by Sullivan does not meet the requirements of the present claims because Sullivan gives no direction as to sulfur activity or CCT performance of the polysulfide mixture. In fact, the term "polysulfide mixture" is an incredibly broad term encompassing an uncountable number of possible compositions.

The polysulfide of Sullivan is said to include a mixture of less than 88 wt% dihydrocarbyl trisulfide, 4-6 wt% dihydrocarbyl disulfide, and 7-10 wt% dihydrocarbyl tetrasulfide or higher polysulfides. (See paragraph [0020]). In Table 1 of Sullivan, the polysulfide composition is also said to include a monosulfide. There is no disclosure or mention in Sullivan regarding sulfur activity or the CCT value of its polysulfide mixtures, or the thermal stability thereof.

Mixtures of dihydrocarbyl trisulfide, dihydrocarbyl disulfide, and dihydrocarbyl tetrasulfide or higher polysulfides exist which do not have a sulfur activity of greater than 125 mg in the CCT. The criticality of the polysulfide mixture having the claimed CCT cannot be learned from Sullivan.

By using the contributions claimed by Sullivan and, for the sake of argument, relating to Table #3 in our application, we can see the relationship of CCT to specific polysulfides. CCT can be stated as the sum total of the contribution of specific sulfur linkages in the polysulfide mixture. By using the contribution of #5 and #6 as the S4+ sulfur linkages proposed by the Sullivan claim, one can calculate that 26% of tetrasulfide (#5 example below) is required to boost the overall CCT of the polysulfide to the 125 CCT as we presently claim. (121 CCT / 466 = 26 wt% #5). The EP additive formulated from the #6 example below shows that 16.6% of this S4 or higher polysulfide is needed to meet the 125 CCT requirement in

our application. (121 CCT / 731 = 16.6 wt % #6). These amounts are outside the disclosed ranges in Sullivan.

Expanded Table 3 from page 17 of Specification						
Ex. #	**EP Additive**	**Sulfur**	**CCT**	**Sullivan Disclosure**	**CCT Contribution Using #5 Polysulfide**	**CCT Contribution Using #6 Polysulfide**
1	SIB	Sx	55			
2	Polysulfide	Sx	126			
3	Di-t-butyl-disulfide	S2	2	4-6 wt%	2 x 0.04 = 0.08 2 x 0.06 = 0.12	2 x 0.04 = 0.08 2 x 0.06 = 0.12
4	Di-t-butyl-trisulfide	S3	4	< 88 wt%	4 x 0.88 = 3.52	4 x 0.88 = 3.52
		S4+		7-10 wt%		
5	Di-t-butyl-tetrasulfide	S5	466		466 x 0.07 = 32.62 466 x 0.1 = 46.6	
6	Di-t-nonyl-polysulfide	S4+	731			731 x 0.07 = 51.17 731 x 0.1 = 73.1
				TOTAL Sullivan CCT Range =	36.22-50.24	54.77-76.74

Clearly, many combinations of polysulfide mixtures exist that do not meet the 125 CCT polysulfide mixture that is necessary to provide the combination of EP and thermal stability that we have discovered and presently claimed. Further, one reading Sullivan would have to conduct excessive experimentation to arrive at our presently claimed CCT value.

Further, if the CCT value is too high or too low, the thermal stability of and extreme pressure performance of the lubricant composition will be adversely affected. The present patent application relies on the fact that a polysulfide mixture is present that has a sulfur activity of greater than 125 mg in the CCT in combination with a thermally stable dithiophosphate ester and thiophosphate salt. Thus, sufficient extreme pressure performance is achieved without very high treat rates or the addition of other extreme pressure components. (See Specification page 6, first full paragraph).

The presently claimed composition provides an unexpected performance benefit based on selection of the CCT and sulfur activity of the polysulfide mixture, which is dependent upon the specific proportions of the different polysulfides being combined in the mixture, as well as the concentration of the dithiophosphate in the composition, as taught in the present application. This selection is not merely an optimum value, as alleged in the Advisory Action, but rather the composition of the present application

having both a high CCT, as well as a relatively low ISOT score is, critical to achieving the unexpected results of the present invention.

8. The di-*t*-butyl polysulfide recited in Table 1 is described on page 6 of the application as a mixture of di-*t*-butyl tetra, tri, and di sulfides, such that the mixture has a CCT of greater than about 125 mg.

9. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2/4/2009
Date

Jeffrey L. Milner